

GCE



Edexcel GCE

Biology (Human) (6115/01)

Summer 2005

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Mark Scheme (Results)

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Biology (Human) (6115/01)

General Principles

Symbols used in the mark scheme

Symbol	Meaning of symbol
; semi colon	Indicates the end of a marking point.
eq	Indicates that credit should be given for other correct alternatives to a word or statement, as discussed in the Standardisation meeting. It is used because it is not always possible to list every alternative answer that a candidate may write that is worthy of credit.
/ oblique	Words or phrases separated by an oblique are alternatives to each other.
{ } curly brackets	Indicate the beginning and end of a list of alternatives (separated by obliques) where necessary to avoid confusion.
() round brackets	Words inside round brackets are to aid understanding of the marking point but are not required to award the point.
[] square brackets	Words inside square brackets are instructions or guidance for examiners.

Crossed out work

If a candidate has crossed out an answer and written new text, the crossed out work can be ignored. If the candidate has crossed out work but written no new text, the crossed out work for that question or part question should be marked, as far as it is possible to do so.

Spelling and clarity

In general, an error made in an early part of a question is penalised when it occurs but not subsequently. The candidate is penalised once only and can gain credit in later parts of the question by correct reasoning from the earlier incorrect answer.

No marks are awarded specifically for quality of language in the written papers, except for the essays in the synoptic paper. Use of English is however taken into account as follows:

- the spelling of technical terms must be sufficiently correct for the answer to be unambiguous
e.g. for amylase, 'ammalase' is acceptable whereas 'amylose' is not
e.g. for glycogen, 'glicojen' is acceptable whereas 'glucagen' is not
e.g. for ileum, 'illeum' is acceptable whereas 'ilium' is not
e.g. for mitosis, 'mytosis' is acceptable whereas 'meitosis' is not
- candidates must make their meaning clear to the examiner to gain the mark.
- a correct statement that is contradicted by an incorrect statement in the same part of an answer gains no mark - irrelevant material should be ignored.

Question 1*

* common with 6105

Maximum mark

- (a)
1. {Breaks / disrupts} hydrogen bonds between {bases / nucleotides} ;
 2. Strands separate / eq ;
 3. To expose base (sequences) ;

2 marks

- (b)
1. Short {sections / lengths} of nucleotides / 10-40 nucleotides ;
 2. Single stranded ;
 3. Reference to sequence of {bases / nucleotides} complementary to those on DNA ;
 4. {Select target / eq} section of DNA ;
 5. Reference to primer starting polymerase reaction ;

3 marks

- (c) Bacterial process {slower / takes longer / takes days} / {chance of error / difficult} ;

1 mark**Total 6 marks**

Question 2*

* common with 6105

Maximum mark

- (a)
1. Unable to {reproduce with each other / mate with each other / interbreed / eq} / cannot produce fertile offspring ;
 2. (Because of) {different mating behaviour / different mating seasons / different mating times of year / genetic incompatibility / eq} ;
 3. Reference to different species having different {features / appearance / characteristics} ;

2 marks

- (b)
- Idea of {DNA fingerprinting / genetic fingerprinting / hybridisation / base sequencing / amino acid sequencing / immunological comparison} ;
- {Close / eq} match between {DNA / protein / eq} (of two species) ;

2 marks

- (c)
1. Reference to allopatric speciation ;
 2. Populations {physically / geographically} separated / idea of {barrier / strip of land} separating populations ;
 3. Two populations {were unable to interbreed / prevented from breeding} ;
 4. {Environmental conditions / eq} differ (on either side of the isthmus) ;
 5. Reference to different selective pressures / different {features / alleles} selected in two populations / each population subjected to natural selection ;
 6. (Leads to) {formation / eq} of different {deme / gene pools} / eq ;
 7. Leads to {change / divergence} in {behavioural / physical} {characteristics / appearance} ;
 8. Reference to founder effect ;
 9. Reference to genetic drift ;

5 marks**Total 9 marks**

Question 3**Maximum mark**

- (a) 1. Alternative form of a gene / eq ;
2. At the same locus / eq ;

2 marks

- (b) 1. Reference to {amniocentesis / chorionic villus sampling} ;
2. Taken from {amniotic fluid / fetal membranes / chorionic villus} ;
3. Using {instrument / syringe / eq} inserted through {abdominal wall / uterine wall / cervix / vagina} ;

2 marks

- (c) (i) 1. 0.25 / 25% / $\frac{1}{4}$ / 1 in 4 ;
2. F and G are both {carriers / heterozygous} for MSUD ;
3. Because {they have a child with MSUD / J has MSUD} ;
4. (Fourth child would) have to {be homozygous for MSUD / inherit MSUD from each parent} to have the disorder ;

3 marks

- (ii) 1. Female F {inherited / eq} MSUD allele from one of parents ;
2. (Therefore) at least one of them is {a carrier / heterozygous} (for MSUD) ;
3. No evidence that both A and B are {carriers / heterozygous} ;
4. Because neither {of their children have / E or F has} MSUD ;

2 marks**Total 9 marks**

Question 4*

* common with 6105

Maximum mark

- (a)
1. Both increased between 1970 and 1975 / both peak in 1975 ;
 2. (Overall) farmland birds decreased {more / faster} than woodland birds ;
 3. From 1995 to 2000 woodland birds increased and farmland birds decreased ;
 4. Comparative manipulated figures (e.g. 10.5 and 41.4, 30.9, 4 times greater fall in farmland birds) ;

2 marks

- (b)
1. {Insects / primary consumers} increase because fewer eaten ;
 2. {Producers / plants} decrease because more {herbivores / primary consumer / insects} ;
 3. {Predators / tertiary consumers / top carnivores} decrease because fewer birds ;
 4. {Predators / tertiary consumers / top carnivores} {eat / eq} other {secondary consumers / prey} ;
 5. (Therefore) other {secondary consumers / prey} decrease ;
 6. Other secondary consumers increase because {less competition / more food / more insects} ;

[Accept suitable named example(s) in any marking point]

4 marks

Question 4 continued***Maximum mark**

* common with 6105

- (c)
1. Idea of birds eating insects sprayed with pesticide ;
 2. {Reference to / description of} bioaccumulation ;
 3. Fertiliser leads to {nitrate runoff / eutrophication} ;
 4. Fertiliser encourages the growth of fast growing plants / eq ;
 5. Prey birds seen more easily by predators / not easy for prey birds to hide from predators ;
 6. {Disruption / loss of} habitat ;
 7. Loss of {nesting / roosting} sites ;
 8. Loss of food / changes in food / disruption of {food chains / webs} ;
 9. Decrease in variety of foods ;

6 marks**Total 12 marks**

Question 5*

* common with 6105

Maximum mark

- (a) Made from { β -glucose / cellulobiose} ;
Linked by (1-4-)glycosidic bonds ;
Unbranched / straight / linear ;

3 marks

- (b) (i) 1. Acid peaks at 5, neutral peaks at 6 / {acid peaks at lower pH / neutral peaks at higher pH} ;
2. Activity of both is the same at 5.5 ;
3. Comment on the shape of the curve i.e. acid bell-shaped, neutral flatter ;
4. Neutral active over a wider range / converse ;

2 marks

- (ii) {Raising / eq} temperature / change the pH beyond the range shown on the graph / add inhibitor / wash enzyme away / add strong {acid / alkali} ;

1 mark

Question 5 continued ***Maximum mark**

* common with 6105

- (c)
1. {Restriction enzyme / endonuclease} to cut out (cellulase) {gene / section of DNA} (from fungus) ;
 2. Obtain plasmids from bacteria ;
 3. Open plasmid using same {restriction enzyme / endonuclease} ;
 4. Insert (cellulose) gene into plasmid ;
 5. Reference to sticky ends ;
 6. (Ends joined by) ligase ;
 7. Insert plasmid into bacteria ;
 8. Reference to method such as {electroporation / treatment with calcium chloride / electrical shocking / salt shocking} ;

5 marks

- (d)
1. To digest {cellulose / cellulobiose} in {grass / equivalent food} ;
 2. (Since) ruminant unable to produce the enzyme ;
 3. Found in the rumen ;
 4. Cellulase breaks down cellulose into {sugars / monosaccharides / disaccharides / glucose / hexose} ;
 5. Which then produce organic acids ;

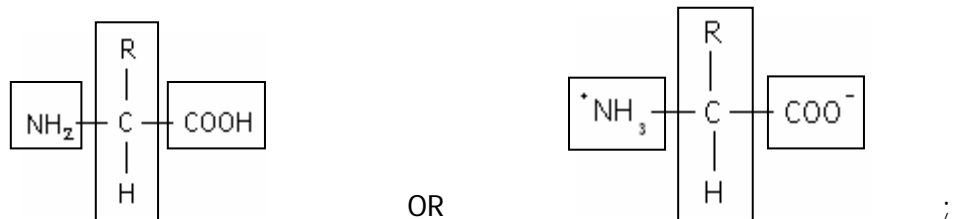
2 marks**Total 13 marks**

Question 6*

* common with 6105

Maximum mark

(a)



[3 areas correct = 2 marks]

[2 areas correct = 1 mark]

2 marks

- (b)
1. One of the bases in the DNA is changed ;
 2. By {addition / deletion / substitution} ;
 3. (Addition / deletion) results in a {frame / eq} shift ;
 4. Changes the sequence of amino acids / substitution changes the amino acid ;
 5. Changes the enzyme {shape / 3D structure / tertiary structure} / changes active site (of enzyme) ;
 6. Substrate unable to fit active site ;

4 marks

- (c)
1. To enable the impulse to pass from one {nerve cell / neurone} to another ;
 2. Arrival of {action potential / impulse} cause release of transmitter ;
 3. Reference to diffusion of transmitter across {cleft / gap} ;
 4. Binds to {receptor / protein} on post-synaptic membrane ;
 5. Role in {opening / closing} ion channels on post synaptic membrane ;
 6. Cause {depolarisation / polarisation (in inhibitory) / hyperpolarisation (in inhibitory)} on the post-synaptic membrane ;

3 marks**Total 9 marks**

Question 7**Maximum mark**

- (a)
1. Reference to thin wall ;
 2. Single cell layer / reference to squamous epithelium ;
 3. Decreases diffusion distance ;
 4. Reference to surfactants prevent {alveolar collapse / cells sticking together} ;
 5. Reference to {network / eq} of capillaries ;
 6. Reference to maintenance of diffusion gradient ;

3 marks

- (b) (i)
1. Alveolar air has had oxygen removed ;
 2. Expired air is mixture of {(inspired) air / air in tubes} and alveolar air ;

2 marks

- (ii)
1. Air (in alveoli) {ventilated / replenished frequently} / eq ;
 2. Idea of blood flowing through the capillaries ;
 3. Reference to {oxygen / oxygenated blood} being carried away / allow converse for carbon dioxide ;

2 marks

Question 7 continued**Maximum mark**

- (c)
1. Smoker's {babies have lower birth weight / fetus has low growth rate} ;
 2. Baby may have poorer {lung / eq} function ;
 3. Reference to poor brain {development / function} ;
 4. Reduced oxygen supply to fetus as carbon monoxide (in smoke) replaces oxygen ;
 5. Smoking interferes with mother's uptake of vitamin {B / C / folic acid} ;
 6. Increased risk of placental complications e.g. placental abruption / eq ;
 7. Increased risk of {still birth / premature birth / miscarriage / eq} ;
 8. Reference to nicotine interfering with fetal development ;
 9. Reference to baby having nicotine addiction ;

3 marks

- (d)
1. Increased {death rate / eq} in older people / eq ;
 2. Increased {death rate / eq} in {middle-aged people / 40-60 year olds} ;
 3. Reference to {cancer / emphysema / bronchitis / circulatory disorders / eq} ;
 4. Decreased birth rate / fewer children ;
 5. Decreased fertility / {failed pregnancy / eq} / childhood disease ;

2 marks**Total 12 marks**